MUSCULOSKELETAL / NEUROLOGIC · NGN NCLEX 2026

# Lumbosacral *Disc Herniation*

Displacement of the nucleus pulposus through a torn annulus fibrosus, most commonly at **L4–L5** and **L5–S1**, producing nerve root compression (sciatica) and — in cauda equina syndrome — a true surgical emergency.

Adult Health | Pain & Mobility | Cauda Equina Alert | High-Yield NGN 2026

# 1 Definition & Overview

WHAT IS HAPPENING & WHY IT MATTERS

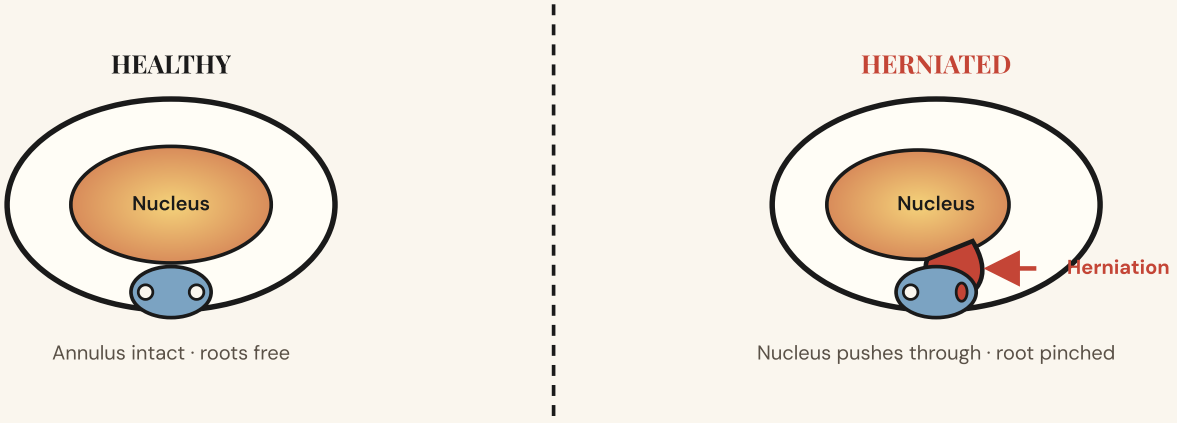
## What it is

- Rupture or protrusion of the gel-like **nucleus pulposus** through the tough outer **annulus fibrosus** of an intervertebral disc.
- Compresses adjacent **spinal nerve roots** → *radiculopathy* (sciatica) with pain, paresthesia, and motor weakness in a dermatomal pattern.
- ~95% of lumbar herniations occur at **L4–L5 or L5–S1** (the lowest, most weight-bearing levels).

## Why it matters

- Leading cause of **low back pain & sciatica** in adults ages 30–50.
- Risk factors: **heavy lifting, twisting, obesity, smoking, aging discs, sedentary jobs**.
- **Cauda equina syndrome** (saddle anesthesia + bowel/bladder dysfunction) is a *surgical emergency* — decompression within 24–48 hr to prevent permanent deficit.

### Lumbar Disc — Healthy vs. Herniated




*Cross-sectional (axial) view of a lumbar vertebral disc. Posterolateral herniation is the most common pattern and impinges on the traversing nerve root.*

## 2 Pathophysiology

HOW THE INJURY CASCADE UNFOLDS

1. Disc degeneration: water content ↓, annulus weakens with age, repetitive stress, smoking.
2. Mechanical trigger (lift / twist / strain) → annulus fibrosus tears.
3. Nucleus pulposus protrudes posterolaterally into spinal canal.
4. Compression + inflammation of nerve root → radiculopathy.
5. Severe/central: cauda equina compression → emergency.

### Dermatome Cheat Sheet

- **L4 root (L3–L4 disc):** pain anterior thigh → medial calf; weak quadriceps; ↓ patellar reflex.
- **L5 root (L4–L5 disc):** pain lateral thigh/calf → dorsum of foot & great toe; weak dorsiflexion → *foot drop*.
- **S1 root (L5–S1 disc):** pain posterior thigh/calf → lateral foot & little toe; weak plantarflexion; ↓ Achilles reflex.

## 3 Signs & Symptoms

EARLY → LATE · WITH RED-FLAG FINDINGS

### Early / Mild

- Dull, aching **low back pain** worse with sitting, bending, coughing, sneezing (Valsalva).
- Pain radiating into one buttock / posterior leg → **sciatica**.
- Paresthesia (numbness, tingling) in a **dermatomal pattern**.
- **Positive straight-leg raise (SLR):** pain reproduced with leg lifted 30–70°.
- Muscle spasm; gait favoring affected side.

### Late / Severe

- **Motor weakness** — foot drop (L5), inability to toe-walk (S1) or heel-walk (L5).
- Diminished or absent **deep tendon reflexes** (patellar L4, Achilles S1).
- Muscle atrophy with chronic compression.
- Sharp, electric, burning pain disrupting sleep.
- Bowel/bladder changes → **cauda equina** (see red flag).

### 🚨 RED FLAG · Cauda Equina Syndrome

**Surgical emergency — call provider STAT.** Compression of the cauda equina nerve roots produces:

- **Saddle anesthesia** — numbness over perineum, inner thighs, buttocks
- **New urinary retention or incontinence**
- **Bowel incontinence / loss of rectal tone**
- **Bilateral leg weakness** or progressing motor deficit
- **Loss of sexual function**

*Decompression within 24–48 hours is required to prevent permanent paralysis and incontinence.*

# 4 Priority Nursing Interventions

ABCS · SAFETY · PAIN · MOBILITY

## Assess & Monitor

- **Neurovascular checks** q2–4h: motor, sensation, reflexes, pulses bilaterally.
- Pain rating, location, radiation, triggers (PQRST).
- **Bladder & bowel function** every shift — new retention = cauda equina until proven otherwise.
- Skin integrity in numb dermatomes (risk for unnoticed injury).
- Straight-leg raise findings & gait.

## Positioning & Activity

- **Semi-Fowler with knees flexed** (pillow under knees) — opens neural foramina.
- **Log-roll** with pillow between knees; firm mattress; *no twisting*.
- **Limited activity 24–48 hr only** — prolonged bed rest worsens outcomes.
- Early ambulation & PT referral once tolerated.
- Apply **moist heat or ice** per orders to relieve spasm.

## Pain Management

- Administer NSAIDs / muscle relaxants / short-course opioids as ordered.
- Non-pharm: heat, ice, massage, distraction, repositioning.
- Prepare for **epidural steroid injection** when indicated.
- Monitor opioid side effects — constipation, sedation, respiratory depression.

## Post-Op (Discectomy / Laminectomy / Fusion)

- **Log-roll only;** no twisting, BLT (bending, lifting, twisting).
- Assess dressing for drainage — *clear fluid = CSF leak* (test for glucose, notify provider).
- Neuro checks q1–2h initially; compare to baseline.
- Voiding within 8 hr; assess for ileus.
- Fit/teach **brace** use after fusion; out of bed with assistance.

# 5 Pharmacology

DRUGS · MECHANISM · SIDE EFFECTS · NURSING PEARLS

| Drug / Class | Mechanism | Key Side Effects | Nursing Considerations |
|---|---|---|---|
| **NSAIDs** Ibuprofen · Naproxen · Ketorolac | Block COX → ↓ prostaglandins → ↓ pain & inflammation | GI bleed, renal injury, ↑ BP, platelet inhibition | Give with food; monitor BUN/Cr & stool for occult blood; limit ketorolac to ≤ 5 days. |
| **Skeletal muscle relaxants** Cyclobenzaprine · Methocarbamol · Baclofen | CNS depression → ↓ muscle spasm | Sedation, dizziness, dry mouth, urinary retention | Fall precautions; avoid alcohol & CNS depressants; short-term use only. |
| **Opioids (short-term)** Oxycodone · Hydrocodone · Tramadol | Bind μ-opioid receptors → altered pain perception | Sedation, respiratory depression, constipation, dependence | Monitor RR & LOC; bowel regimen; lowest effective dose, shortest duration. |
| **Neuropathic agents** Gabapentin · Pregabalin | Bind α2δ $Ca^{2+}$ channels → ↓ neuronal firing | Drowsiness, dizziness, peripheral edema, weight gain | Titrate slowly; never stop abruptly (seizures); fall precautions. |
| **Corticosteroids** Prednisone PO · Methylpred / Dex epidural | Suppress inflammation around nerve root | Hyperglycemia, mood/insomnia, GI upset, immunosuppression, osteoporosis | Taper — never stop suddenly; monitor BG; take with food. |
| **Stool softeners** Docusate | ↑ water in stool | Generally well tolerated | Add prophylactically with opioids; encourage fluids & ambulation. |

# 6 NCLEX Test Traps

WRONG-VS-RIGHT THINKING

| ✗ TRAP | ✓ RIGHT ANSWER |
|---|---|
| "Strict bed rest for 1–2 weeks" sounds therapeutic. | Bed rest is limited to **24–48 hours**; prolonged bed rest causes deconditioning and worse outcomes. Early mobilization + PT is the standard. |
| Selecting "administer pain medication" when a client reports new saddle anesthesia and can't void. | This is **cauda equina syndrome** — *notify provider STAT* & prepare for emergent imaging/surgery. Pain meds come after recognition. |
| Placing the post-op laminectomy client supine with the bed flat for "spinal alignment." | **Log-roll** the client side-to-side with a pillow between the knees. *No twisting, bending, or lifting (BLT).* |
| Documenting clear drainage on the post-op dressing as "expected serous output." | Clear drainage may be **CSF leak**. Mark the spot, test for glucose (positive = CSF), notify provider — do *not* simply reinforce the dressing. |
| Teaching the client to "bend at the waist to pick up the laundry basket." | **Bend at the knees**, keep back straight, hold close to the body. Push instead of pull. Twisting is the #1 trigger for re-herniation. |
| Stopping gabapentin or prednisone abruptly once symptoms improve. | Both must be **tapered**. Abrupt gabapentin withdrawal → seizures; abrupt steroid withdrawal → adrenal crisis. |

# 7 Patient & Family Education

PREVENT RE-INJURY · PROMOTE HEALING

## Body Mechanics

- **Bend at the knees**, not the waist.
- Hold objects **close to the body**.
- **Push, don't pull** heavy items.
- No twisting — pivot with the feet.
- Avoid lifting > 10 lb during recovery; nothing > 20 lb after fusion.

## Lifestyle

- Maintain a **healthy weight** — extra pounds stress the lumbar spine.
- **Stop smoking** — nicotine impairs disc nutrition & healing.
- Sleep on a **firm mattress**, side-lying with pillow between knees.
- Use chairs with lumbar support; feet flat on floor.
- Take frequent breaks from sitting; walk every hour.

## Exercise & Recovery

- Follow **PT-prescribed core strengthening** & stretching.
- Low-impact aerobic: **walking, swimming**.
- Avoid high-impact sports during healing.
- Use ice 24–48 hr post-flare, then moist heat for spasm.
- Wear brace as prescribed after fusion.

## 🚨 Call 911 or return to ED immediately if:

- New numbness in the groin / saddle area
- Loss of bowel or bladder control
- Sudden severe weakness in one or both legs
- Fever with severe back pain (possible spinal infection)

## 8 Memory Boosters & Mnemonics

QUICK RECALL FOR EXAM DAY

### B · L · T

**Post-op spine "Don'ts" — no BLT sandwich!**

- **B** — **B** ending
- **L** — **L** ifting (> 10 lb)
- **T** — **T** wisting

### SADDLE

**Cauda Equina red flags — every letter is an emergency:**

- **S** — **S** addle anesthesia
- **A** — **A** nesthesia perineum
- **D** — **D** ribbling urine / retention
- **D** — **D** ecreased rectal tone
- **L** — **L** eg weakness (bilateral)
- **E** — **E** rectile dysfunction

### LOG ROLL

**Turn the post-op client like a log — head, shoulders, hips, knees move as ONE unit. Pillow between the knees. NO twisting!**

### L4 · L5 · S1

**"4–5–1, herniate is the one"** — the 3 lumbar levels to know. L5–S1 is most common.

- **L4** — Knee jerk gone, weak quad
- **L5** — Foot drop, big toe weak
- **S1** — Ankle jerk gone, can't toe-walk

### SLR +

**Straight Leg Raise** — pain reproduced at 30–70° = nerve root irritation. *Classic NCLEX assessment finding.*

# 9 Clinical Judgment in Action

NCJMM 6-STEP FRAMEWORK · NEXT-GEN NCLEX

## SCENARIO

A 47-year-old male presents to the ED with a 3-week history of low back pain after lifting boxes at work. Today his wife brought him in because he noticed numbness in his inner thighs and "can't tell when his bladder is full." Vitals: BP 138/84, HR 92, RR 18, T 98.6°F, $SpO_2$ 98%. He rates pain 8/10, radiating down both legs. He has not voided in 10 hours; bladder scan shows 680 mL.

### 1 Recognize Cues

**Relevant:** Saddle (inner thigh) numbness · bilateral leg radiation · urinary retention (680 mL · 10 hr) · loss of bladder sensation · recent heavy lifting · pain 8/10.
**Less relevant:** Stable vital signs, normal $SpO_2$.

### 2 Analyze Cues

Cluster suggests **cauda equina syndrome** from a large central lumbar disc herniation: saddle anesthesia + new urinary retention + bilateral leg involvement + recent mechanical trigger. This pattern overrides simple sciatica.

### 3 Prioritize Hypotheses

**#1 Cauda equina syndrome — surgical emergency** (time-sensitive permanent disability risk).
#2 Acute urinary retention with bladder distension.
#3 Uncontrolled radicular pain.

### 4 Generate Solutions

- Notify provider **STAT** for cauda equina concern.
- Prepare for **emergent MRI** of the lumbar spine.
- Insert urinary catheter per order to decompress the bladder.
- Keep NPO in anticipation of urgent surgical decompression (within 24–48 hr).
- Establish IV access; baseline labs & type/screen.
- Frequent neuro checks — motor, sensation, reflexes, rectal tone.

### 5 Take Action

Nurse calls provider, reports SBAR including saddle anesthesia and 680 mL retention. Catheter inserted → 720 mL clear urine drained. MRI confirms large L4–L5 central herniation compressing the cauda equina. Client transported to OR for emergent **microdiscectomy + laminectomy**. Log-roll precautions taught to family.

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## Evaluate Outcomes

**Effective:** bladder sensation returns within 48 hr · pain ↓ to 3/10 · saddle sensation improving · ambulating with PT on day 2 · no bowel incontinence.

**Continue to monitor:** motor strength, voiding pattern, surgical site for CSF leak, infection signs. Reinforce BLT restrictions, body mechanics, and neurosurgery follow-up.

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